Utility of CT Scanning in the Evaluation of Pediatric Emergency Department Patients Presenting with Otologic Complaints

Darrin Bann MD, PhD[1]; Robert Saadi MD[1], Linda Gangai RN[2];
Kathryn Kasmire MD, MS[2]; Huseyin Isildak MD[1]; and Neerav Goyal MD, MPH[1]
Departments of Otolaryngology – Head & Neck Surgery[1] and Emergency Medicine[2]
Penn State Health Milton S. Hershey Medical Center, Hershey, PA

Introduction

In pediatric patients, computed tomography (CT) imaging of the temporal bone is most commonly performed for infectious indications or as part of a trauma evaluation. Due to the complex anatomy of the temporal bone, CTs must be high-resolution with a slice thickness of < 1.0 mm, have a high signal-to-noise ratio, and minimize artifact. Importantly, achieving these goals typically requires a relatively high radiation dose. Because CT imaging is associated with increased lifetime cancer risk (particularly in children), multiple algorithms have been developed to reduce the radiation dose associated with temporal bone CT. However, the best method of harm reduction is to avoid performing CTs that do not inform or alter clinical decision making. The clinical utility of temporal bone CTs in pediatric patients remains unclear.

Methods

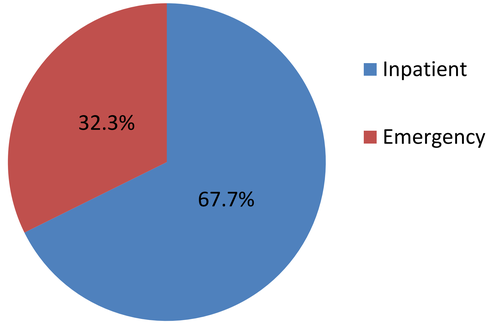
A retrospective chart review was performed to identify patients evaluated at our institution between January 1st 2012 and December 31st 2016 with a diagnosis consistent with otitis externa, otitis media, mastoiditis, or otalgia. The study was expanded to include all pediatric patients who underwent CT temporal bone imaging over the specified time period. Data were collected regarding patient demographics, the indication for imaging, radiographic findings, and clinical outcomes. Statistical significance was determined by Students' T-test or Fisher's Exact Test.

Results

Overall, we identified 2,863 pediatric ED visits fitting inclusion criteria. The most common diagnosis was otitis media (n=1,951, 68%), followed by otalgia (n=699, 24%), and otitis externa (n=207, 7%). Only 1% of patients with otologic complaints underwent a CT scan in relation to their ED visit.

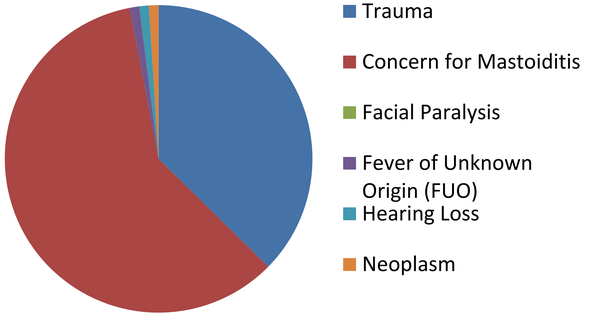
When all pediatric CT temporal bone studies were included, we identified 99 studies in 91 unique patients. Most imaging studies were associated with an inpatient admission (Figure 1).

Figure 1. Admission status of pediatric patients undergoing CT Temporal Bone Scanning



The most common indications for imaging were to evaluate for complications of acute otitis media (59.6%) or as part of a trauma evaluation (37.4%) (Figure 2). Trauma patients were more likely to be male (65%) compared to patients who had a CT temporal bone study for infections indications (54%), although this did not reach statistical significance (p=0.4).

Figure 2. Indication for CT Temporal Bone



Only 21% (n=21) required surgery for acute mastoiditis, such as mastoidectomy, tympanostomy tube placement, and/or abscess drainage. No patient identified in this study population underwent a facial nerve decompression secondary to trauma.

Discussion

CT temporal bone imaging is not routinely performed during the emergency department evaluation of patients presenting with otologic complaints. Nonetheless, most patients who have CT temporal bone studies do not undergo surgery, suggesting that there are opportunities to reduce the number of CT temporal bone studies performed.